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AERIAL STUDIES OF THE WEST INDIAN MANATEE
(Trichechus manatus)
ON THE WEST COAST OF FLORIDA FROM 1985-1990:
A COMPREHENSIVE SIX YEAR STUDY

Submitted to:

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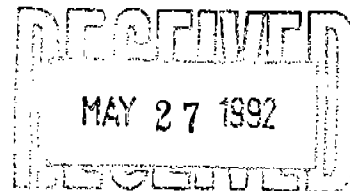
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I. INTRODUCTION AND PROBLEM STATEMENT

The West Indian manatee, Trichechus manatus, is an endangered species of the order Sirenia including both manatees and dugongs. The local Florida manatee, Trichechus manatee latirostris, is a distinct subspecies of the Caribbean T. manatus (Domning and Hayek, 1986). Early studies have shown that manatee distribution and range is dependent on water temperatures but the animals are free to move from fresh to brackish or saline water. During colder months when water temperatures fall below 20° C, manatees move to warm water sources such as natural springs or man-made power plant effluent (Hartman, 1974, 1979).

Manatees are generally considered solitary animals with the only strong social bond existing between mother and calf, who remain together for up to two years or longer (Hartman, 1979). Large groups, occasionally observed throughout the year, are often mating herds. One female (cow) is pursued by several males (bulls) for up to a month while she is in estrous. Once the cow becomes receptive, she copulates successively with several bulls (Hartman, 1971, 1979). After approximately a 13-15 month gestation period, the cow gives birth to one calf (occasionally two) resulting in a three to five year breeding cycle (Moore, 1951). Lifespan and total number of calves a female can produce in her lifetime remain unknown at this time.

The Florida manatee is protected by federal, state, and even local legislation. In spite of this protection, it is still in jeopardy throughout its entire range due to a low reproductive rate, loss of habitat, and high mortality, the latter two partially associated with human activity.

In order to determine if the population level and site usage are changing long-term surveys must be conducted. Aerial surveys economically provide valuable information on habitat usage and patterns as well as relative abundance within a survey region. Due to the consistent methodology used with aerial surveys, management decisions can be based soundly on the data collected.

Numerous aerial surveys have been conducted to assess manatee populations on the West coast as well as other parts of Florida. Some population estimates based on aerial surveys determined Florida's manatee population at 1,200 with about equal numbers on the east and west coasts of the state (Weigle, 1987). Statewide synoptic surveys of the east and west coast as well as mid-state

waters to determine the Florida population counted 1465 individuals in 1991 and 1856 in 1992 (Ackerman, FDNR unpublished data).

Mote Marine Laboratory has been conducting aerial surveys to estimate manatee populations and distribution since 1985. This report presents the six years of data collected in these areas from 1985-1990. The primary objectives were to determine the relative abundance, distribution, seasonality, and habitat requirements for manatees in the bays, gulf and rivers of this study area. The continuous surveys also provide data necessary to monitor changes in level of use and to detect secondary manatee areas and possible migratory routes. Specific goals are outlined as:

Year 1. Identify if preferred areas exist.

Years 2-6. Determine variability in preferred-site usage.

Years 6-10. Monitor variability and identify habitat preference determinants.

This report presents the results and conclusions for the first two goals.

II. STUDY DESIGN

A. Field Methods

Figure 1 illustrates the study area, showing the boundaries of the northern and southern regions. The northern region extends from the northern tip of Anna Maria Island to Venice, FL and has been surveyed since 1985. The southern region, from Venice to the northern portion of Charlotte Harbor and the Myakka River has been surveyed since 1987. Each region consists of one "flight"; one "survey" of both northern and southern regions normally takes two days (and subsequently two flights) to complete.

Flights were conducted at 80-90 knots at an altitude of 150 meters (500 feet), using either a Cessna 152 or 172 high wing aircraft. Bays were surveyed starting at the north end of the survey area and flown south. The Gulf beaches and the Myakka River were typically surveyed from south to north. Occasionally, flights had to be postponed, altered or aborted (resulting in incomplete surveys) under certain conditions which include: 1) wind speed or gusts exceeded 15 mph; 2) Visual Flight Rules (VFR) were not in effect; 3) severe weather was forecast or encountered for the observation period; or 4) sighting conditions (combined water clarity and surface conditions) were too adverse.

A primary observer (with at least 25 hours of aerial survey experience

and wearing polarized sunglasses for increased visual penetration through the water) occupied the right front seat. Secondary observers occasionally occupied the rear seats. All manatee sightings were logged with appropriate notations if the primary observer did not make the initial sighting. Photographic records were made of any unique sightings or animals with scar patterns that might be recognizable in the future (these data are not covered in this report).

Once spotted, herds (also referred to as sightings and defined as one or more animals) were circled until all data could be recorded and verified. The location, number, life stage (adult or calf), and any identifiable behaviors were recorded on the standardized map sets. Manatee locations were indicated on the maps by a "T.m." with a dot (if the herd was stationary) or with a directional arrow (showing vector of movement). The number of animals in the herd was recorded next to the "T.m.", as was the initial time of the sighting and the numbers of any photos taken.

Additional data recorded for each page of the map set included: date of the survey, the beginning and end times, water clarity, surface conditions, number of adults, number of calves, and total number of manatees sighted. For the purpose of this study, calves were defined as one-half of the length (or less) of accompanying adults. Water clarity was estimated from the air throughout the study area according to the scheme in Table 1. Surface conditions were classified according to a modified Beaufort scale presented in Table 2. Incidental sightings of sea turtles (Caretta caretta) and bottlenose dolphins (Tursiops truncatus) were noted but are not discussed in this report.

Monthly air temperature averages were provided by the weather station at Mote Marine Laboratory. Daily high and low temperatures were averaged to yield a daily average. Daily measures were averaged for each month of each year to provide monthly averages between 1985 and 1990.

Each survey represents a measurement of manatee abundance for that flight only. It is assumed that many of the same manatees are recounted on subsequent flights. The total number of manatees seen for each year is a summation of sightings recorded for each individual survey for that year and does not represent an estimate of the total manatee population for the survey area. Based on low sightings during winter months during the initial surveys, these months were not surveyed as frequently during subsequent years. Since few manatees are present in the study area between December and February, resources

and effort were focused on the period between March and November when more manatees are present.

Presumably, not all manatees are sighted on a survey due to less than optimal water clarity and surface conditions occurring in the area. However, consistent application of established and broadly-accepted methodology provides a means for comparison between surveys. Thus, what is presented is a relative measure of minimum manatee abundance.

B. Analytical Methods

1. Sightings

For the present report, the total survey area was divided into two regions: north and south (Figure 1). The surveys, usually consisting of one northern and one southern flight, were assigned a letter alphabetically for each year. Manatee sighting locations are plotted on maps of the survey area (Figure 2.a-i) as a measure of instantaneous distribution. Each sighting was designated by a year, flight letter and a herd size (number of adults "+" number of calves, e.g. F3+2). The dates corresponding to the flight letters are shown in the survey summary on Table 3.

Relative abundance was shown using several methods including: total number of animals for each year, average number of manatees per survey for each year, estimated maximum population, density, and number of manatees per hour for each year.

The maximum population for the survey area previously had been determined by averaging the five highest survey counts for the northern region and the five highest for the southern region and summing these two values (Nabor and Patton, 1989). To adjust for variation in the number of surveys flown from year to year, the highest counts from 25% of the number of surveys flown were averaged in Kadel, Dukeman and Patton (1991) for the report of the 1988 aerial surveys. For the present report, the highest counts from 5% of the surveys flown were averaged to yield the closest approximation to the maximum population. Maximum populations were determined for the northern and southern regions separately using one day totals for each as well as for the entire survey area using two day totals. Density was determined by dividing the average maximum population for the entire survey area by the total area surveyed (185 km²).

Another measure of relative abundance comes from a determination of the